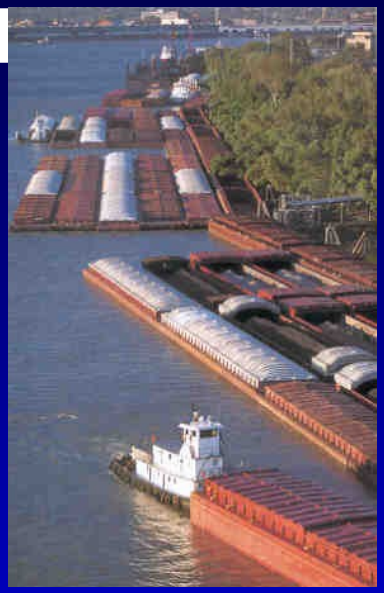
Inland Navigation Research

nland Waterways Conference
March 7, 2007
Cincinnati, OH



Program Manager: James Clausner
HQ Navigation BL Manager: James Walk

Why Are We Here?

- Corps sponsors navigation research
- Support Corps navigation mission
  - Safe, reliable, efficient, cost effective, and environmentally sustainable
- HQ – increase exposure and input from Districts and Industry
- Excellent opportunity to share

Corps Navigation Research Programs

- **Navigation Systems**
- Dredging Operations and Environmental Research
- Coastal Inlets Research
- Dredging Operation Technical Support
- Monitoring Completed Navigation Projects
- Regional Sediment Management
- Inland Electronic Navigation Charts
- Coastal Mapping

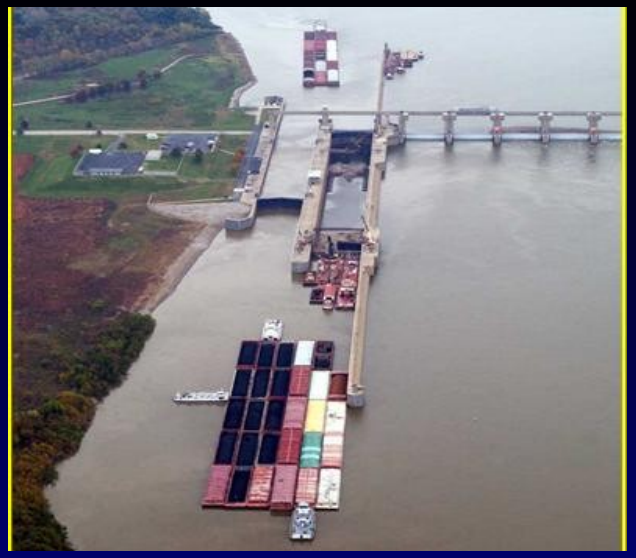
Navigation Systems An Integrated Program”

- ERDC Labs
  - Cold Regions Research Engineering Lab
  - Construction Engineering Research Lab
  - Coastal and Hydraulics Lab
  - Geotechnical and Structures Lab
  - Information Technology Lab
  - Topographic Engineering Lab
- Institute for Water Resources
- Efforts integrated with other Research Programs
- **Industry Input/Cooperation**

Navigation Systems Focus Areas

- Deep Draft Navigation
- Inland Navigation
  - Hydrodynamics
  - Infrastructure

Inland Hydrodynamics Work Area Challenges



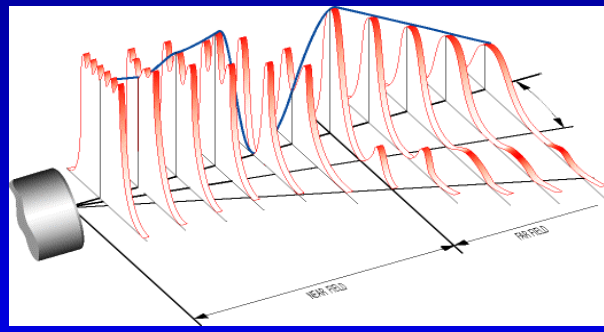
- Aging system with limited capacity
- Need to increase capacity and reliability
- Safer and more efficient lock approaches
- Efficiently handle emergency repairs
- Ice/debris reduce capacity, cause accidents
- Reduce design and construction costs of new/rehabed locks

Inland Hydrodynamics

- **Capabilities**
  - Predictions for vessel impact on lock approach walls
  - Sophisticated hydrodynamic design tools
- **Products**
  - Emergency repair structures/float in construction/ice/debris
  - Scour measurement/predictions
  - Models for impacts on rigid and flexible lock approach walls
  - Real Time Current Velocity at locks**
- **Benefits**
  - Reduce costs and environmental impacts
  - Increase safety, reliability, efficiency, and capacity

Inland Navigation Infrastructure Work Area

- **Challenges**
  - **Most locks are approaching or have exceeded their 50-year economic life**
  - **Unscheduled failures of steel locks gates concrete lock walls, and pumps and motors reduces lock reliability, system efficiency and capacity**
  - **Understand existing condition, relation to strength capacity and remaining service life to effectively plan and schedule repairs, major rehabilitations and replacements**



Inland Navigation Infrastructure

- **Capabilities**
  - Improved tools and techniques to inspect, monitor, maintain and design navigation locks and dams
- **Products**
  - Improve crack predictions and welding techniques for steel lock gates
  - Improve inspection techniques and sensors
  - Innovative concrete rehabilitation technologies to extend life
  - Concrete condition assessment techniques and performance prediction models
  - Condition monitoring and predictive maintenance for motors and pumps, lock automation
- **Benefits**
  - Reduce unscheduled downtime
  - Reduce repair costs due to damage and deterioration
  - Extend life of existing structures at low cost
  - Increase effectiveness in periodic inspections to assess actual structural conditions

Robotic Inspection of Corps Structures

- PI: Gary Phetteplace
- Capability Sought
  - Widespread use of Remotely Operated Vehicles (ROVs) to inspect Corps structures
- Final Products
  - Demo of ROV capabilities
  - Documented benefit/cost of ROVs to meet Corps inspection needs

- Benefits
  - Lower inspection costs
  - Higher inspection rates
  - Less unplanned outages
  - Better asset management
  - Improved public safety
- FY07 Tasks
  - ROV demo at Corps facility
  - Report on Corps-wide benefit/cost

Format for Remaining Talks

- Seven talks
- Question or two for each talk
- 10 Minutes at the end for additional questions
- Bonus Presentation
- Lobby
  - Display
  - Brochures – Web Site
  - Fact Sheets
  - Talk to Engineers at Break